II. PROPER USE

The manufacturer's guidelines for proper use of insert earphones must be followed.

III. AUDIOMETER CALIBRATION

A. Audiometers used with insert earphones must be calibrated in accordance with ANSI S3.6–2004, ''Specification for Audiometers.'' The Director of the Federal Register approves the incorporation by reference of this standard in this section in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. You may obtain a copy of the incorporated standard from the American National Standards Institute at 1819 L Street, NW., Washington, DC 20036 or *http://www.ansi.org*. You may inspect a copy of the incorporated standard at the Federal Railroad Administration, Docket Room, 1200 New Jersey Avenue, SE., Washington, DC 20590, or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030, or go to *http://www.archives.gov/federal__register/code__of__federal__regulations/ibr__locations.html*.

B. Audiometers used with insert earphones must be calibrated using one of the couplers listed in Table 7 of ANSI S3.6–2004.

C. The acoustical calibration shall be conducted annually.

D. The functional calibration must be conducted before each day's use of the audiometer.

IV. BACKGROUND NOISE LEVELS

Testing shall be conducted in a room where the background ambient noise octave-band sound pressures levels meet appendix D to this part.

V. CONVERSION FROM SUPRA AURAL EARPHONES

At the time of conversion from supra-aural to insert earphones, testing must be performed with both types of earphones.

A. The test subject must have a quiet period of at least 14 hours before testing. Hearing protectors may be used as a substitute for the quiet period.

B. The supra-aural earphone audiogram shall be compared to the baseline audiogram, or the revised baseline audiogram if appropriate, to check for a Standard Threshold Shift (STS). In accordance with §227.109(f)(2), if the audiogram shows an STS, retesting with supra-aural earphones must be performed within 90 days. If the resulting audiogram confirms the STS, then it is adopted as the current test instead of the prior one.

C. If retesting with supra-aural earphones is performed, then retesting with insert earphones must be performed at that time to establish the baseline for future audiometric tests using the insert earphones.

VI. REVISED BASELINE AUDIOGRAMS

A. If an STS is confirmed by the re-test with supra-aural earphones, the audiogram may become the revised baseline audiogram per the requirements of §227.109(i) for all future hearing tests with supra-aural earphones. The insert-earphone audiogram will become the new reference baseline audiogram for all future hearing tests performed with insert earphones.

B. If an STS is not indicated by the test with supra-aural earphones, the baseline audiogram remains the reference baseline audiogram for all future supra-aural earphone tests, until such time as an STS is observed. In this case, the insert-earphone audiogram taken at the same time will become the new reference baseline audiogram for all future hearing tests performed with insert earphones.

C. Transitioning Employees with Partial Shifts. Employers must account for the workers who are in the process of developing an STS (e.g., demonstrate a 7 dB average shift), but who at the time of the conversion to insert earphones do not have a 10 dB average shift. Employers who want to use insert earphones must enter the 7 dB shift information in the employee's audiometric test records although it is not an ''STS''. When the next annual audiogram using insert earphones shows an average threshold shift at 2000, 3000 and 4000 Hz of 3 dB, completing the full shift (7 dB + 3 dB), employers must then label that average shift as an STS. This triggers the follow-up procedures at §227.109(h).

VII. RECORDS

All audiograms (including both those produced through the use of insert earphones and supra-aural headsets), calculations, pure-tone individual and average threshold shifts, full STS migrations, and audiometric acoustical calibration records, are to be preserved as records and maintained according to §227.121(c).

[71 FR 63123, Oct. 27, 2006, as amended at 74 FR 25173, May 27, 2009]

APPENDIX F TO PART 227—CALCULATIONS AND APPLICATION OF AGE CORRECTIONS TO AUDIOGRAMS

This appendix is non-mandatory.

In determining whether a standard threshold shift (STS) has occurred, allowance may be made for the contribution of aging to the change in hearing level by adjusting the most recent audiogram. If the employer chooses to adjust the audiogram, the employer shall follow the procedure described below. This procedure and the age correction tables were developed by the National Institute for Occupational Safety and Health in a criteria document. See ''Criteria for a Recommended Standard: Occupational Exposure

to Noise,'' Department of Health and Human Services (NIOSH) Publication No. 98–126. For each audiometric test frequency:

I. Determine from Tables F–1 or F–2 the age correction values for the employee by:

A. Finding the age at which the most recent audiogram was taken and recording the corresponding values of age corrections at 1000 Hz through 6000 Hz;

B. Finding the age at which the baseline audiogram was taken and recording the corresponding values of age corrections at 1000 Hz through 6000 Hz.

II. Subtract the values found in step (I)(B) from the value found in step (I)(A).

III. The differences calculated in step (II) represented that portion of the change in hearing that may be due to aging.

Example: Employee is a 32-year-old male. The audiometric history for his right ear is shown in decibels below.

Employee's age	Audiometric test frequency (Hz)				
	1000	2000	3000	4000	6000
26	10	5	5	10	5
27*	0	0	0	5	5
28	0	0	0	10	5
29	5	0	5	15	5
30	0	5	10	20	10
31	5	10	20	15	15
32*	5	10	10	25	20

a. The audiogram at age 27 is considered the baseline since it shows the best hearing threshold levels. Asterisks have been used to identify the baseline and most recent audiogram. A threshold shift of 20 dB exists at 4000 Hz between the audiograms taken at ages 27 and 32.

b. (The threshold shift is computed by subtracting the hearing threshold at age 27, which was 5, from the hearing threshold at age 32, which is 25). A retest audiogram has confirmed this shift. The contribution of aging to this change in hearing may be estimated in the following manner:

c. Go to Table F–1 and find the age correction values (in dB) for 4000 Hz at age 27 and age 32.

	Frequency (Hz)				
	1000	2000	3000	4000	6000
Age 32	6	5	7	10	14
Age 27	5	4	6	7	11
Difference	1	1	1	3	3

d. The difference represents the amount of hearing loss that may be attributed to aging in the time period between the baseline audiogram and the most recent audiogram. In this example, the difference at 4000 Hz is 3 dB. This value is subtracted from the hearing level at 4000 Hz, which in the most recent audiogram is 25, yielding 22 after adjustment. Then the hearing threshold in the baseline audiogram at 4000 Hz (5) is subtracted from the adjusted annual audiogram hearing threshold at 4000 Hz (22). Thus the age-corrected threshold shift would be 17 dB (as opposed to a threshold shift of 20 dB without age correction).

TABLE F–1—AGE CORRECTION VALUES IN DECIBELS FOR MALES

Years	Audiometric test frequencies (Hz)				
	1000	2000	3000	4000	6000
20 or younger	5	3	4	5	8
21	5	3	4	5	8
22	5	3	4	5	8
23	5	3	4	6	9
24	5	3	5	6	9
25	5	3	5	7	10
26	5	4	5	7	10
27	5	4	6	7	11

TABLE F–1—AGE CORRECTION VALUES IN DECIBELS FOR MALES—Continued

Years	Audiometric test frequencies (Hz)				
	1000	2000	3000	4000	6000
28	6	4	6	8	11
29	6	4	6	8	12
30	6	4	6	9	12
31	6	4	7	9	13
32	6	5	7	10	14
33	6	5	7	10	14
34	6	5	8	11	15
35	7	5	8	11	15
36	7	5	9	12	16
37	7	6	9	12	17
38	7	6	9	13	17
39	7	6	10	14	18
40	7	6	10	14	19
41	7	6	10	14	20
42	8	7	11	16	20
43	8	7	12	16	21
44	8	7	12	17	22
45	8	7	13	18	23
46	8	8	13	19	24
47	8	8	14	19	24
48	9	8	14	20	25
49	9	9	15	21	26
50	9	9	16	22	27
51	9	9	16	23	28
52	9	10	17	24	29
53	9	10	18	25	30
54	10	10	18	26	31
55	10	11	19	27	32
56	10	11	20	28	34
57	10	11	21	29	35
58	10	12	22	31	36
59	11	12	22	32	37
60 or older	11	13	23	33	38

TABLE F–2—AGE CORRECTION VALUES IN DECIBELS FOR FEMALES

Years	Audiometric test frequencies (Hz)				
	1000	2000	3000	4000	6000
20 or younger	7	4	3	3	6
21	7	4	4	3	6
22	7	4	4	4	6
23	7	5	4	4	7
24	7	5	4	4	7
25	8	5	4	4	7
26	8	5	5	4	8
27	8	5	5	5	8
28	8	5	5	5	8
29	8	5	5	5	9
30	8	6	5	5	9
31	8	6	6	5	9
32	9	6	6	6	10
33	9	6	6	6	10
34	9	6	6	6	10
35	9	6	7	7	11
36	9	7	7	7	11
37	9	7	7	7	12
38	10	7	7	7	12
39	10	7	8	8	12
40	10	7	8	8	13
41	10	8	8	8	13
42	10	8	9	9	13
43	11	8	9	9	14
44	11	8	9	9	14
45	11	8	10	10	15
46	11	9	10	10	15
47	11	9	10	11	16

TABLE F–2—AGE CORRECTION VALUES IN DECIBELS FOR FEMALES—Continued

Years	Audiometric test frequencies (Hz)				
	1000	2000	3000	4000	6000
48	12	9	11	11	16
49	12	9	11	11	16
50	12	10	11	12	17
51	12	10	12	12	17
52	12	10	12	13	18
53	13	10	13	13	18
54	13	11	13	14	19
55	13	11	14	14	19
56	13	11	14	15	20
57	13	11	15	15	20
58	14	12	15	16	21
59	14	12	16	16	21
60 or older	14	12	16	17	22

APPENDIX G TO PART 227—SCHEDULE OF CIVIL PENALTIES

Section	Violation	Willful violation
Subpart A—General		
227.3 Application:		
(b)(4) Failure to meet the required conditions for foreign railroad operations	$2,500	$5,000
Subpart B—General Requirements		
227.103 Noise monitoring program:		
(a) Failure to develop and/or implement a noise monitoring program	7,500	10,000
(b) Failure to use sampling as required	2,500	5,000
(c) Failure to integrate sound levels and/or make noise measurements as required	2,500	5,000
(d) Failure to repeat noise monitoring where required	2,500	5,000
(e) Failure to consider work environments where hearing protectors may be omitted	2,500	5,000
(f) Failure to provide opportunity to observe monitoring	2,000	4,000
(g) Reporting of Monitoring Results:		
(1) Failure to notify monitored employee	2,500	5,000
(2) Failure to post results as required	2,500	5,000
227.105 Protection of employees:		
(a) Failure to provide appropriate protection to exposed employee	7,500	10,000
(b) Failure to observe and document source(s) of noise exposures	2,500	5,000
(c)–(d) Failure to protect employee from impermissible continuous noise	5,000	7,500
227.107 Hearing conservation program:		
(a) Failure to administer a HCP	7,500	10,000
(b) Failure to compute noise exposure as required	3,500	7,000
227.109 Audiometric testing program:		
(a) Failure to establish and/or maintain an audiometric testing program	7,500	10,000
(b) Failure to provide audiometric test at no cost to employee	2,500	5,000
(c) Failure to have qualified person perform audiometric test	2,500	5,000
(d) [Reserved]	.....	.....
(e) Failure to establish baseline audiogram as required	3,500	7,000
(f) Failure to offer and/or require periodic audiograms as required	2,500	5,000
(g) Failure to evaluate audiogram as required	2,500	5,000
(h) Failure to comply with follow-up procedures as required	2,500	5,000
(i) Failure to use required method for revising baseline audiograms	2,500	5,000
227.111 Audiometric test requirements:		
(a) Failure to conduct test as required	2,500	5,000
(b) Failure to use required equipment	2,500	5,000
(c) Failure to administer test in room that meets requirements	2,500	5,000
(d) Complete failure to calibrate	5,000	7,500
(1) Failure to perform daily calibration as required	2,000	4,000
(2) Failure to perform annual calibration as required	2,000	4,000
(3) Failure to perform exhaustive calibration as required	2,000	4,000
227.115 Hearing protectors (HP):		
(a) Failure to comply with general requirements	3,000	6,000
(b) Failure to make HP available as required	2,500	5,000
(c) Failure to require use of HP at action level	5,000	7,500
(d) Failure to require use of HP at TWA of 90 dB(A)	5,000	7,500
227.117 Hearing protector attenuation:		
(a) Failure to evaluate attenuation as required	2,500	5,000
(b)–(c) Failure to attenuate to required level	2,500	5,000
(d) Failure to re-evaluate attenuation	2,500	5,000
227.119 Training program:		